

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2003/001458

**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: A61M 1/10

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

REFER TO THE ELECTRONIC DATABASE CONSULTED BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI + key words(heart-assist, counter-pulsation, compress, external etc)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6471633 B1 (FREED) 29 October 2002 See entire document	1-68
X	US 4051840 A (KANTROWITZ et al) 4 October 1977 See entire document	1-68
X	US 4630597 A (KANTROWITZ et al) 23 December 1986 See entire document	11, 15, 54, 56

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
22 January 2004

Date of mailing of the international search report

- 5 FEB 2004

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4979936 A (STEPHENSON et al) 25 December 1990 See entire document	33, 37, 50, 68
X	WO 2002/024254 A2 (IMPERIAL COLLEGE INNOVATIONS LTD) 28 March 2002 See entire document	1, 33, 37, 40, 48, 50-53, 55, 57
X	WO 2000/076288 A2 (SUNSHINE HEART COMPANY PTY LTD) 21 December 2000 See entire document	1, 33, 37, 40, 48, 50-53, 55, 57
X	US 4583523 A (KLEINKE et al) 22 April 1986 See entire document	1, 33, 37, 40, 48, 50-53, 55, 57
X	US 6030336 A (FRANCHI) 29 February 2000 See entire document	15, 33, 37, 40, 48, 50, 52
X	US 6045496 A (PACELLA et al) 4 April 2000 See entire document	15, 33, 37, 40, 48, 50, 52
X	WO 2002/024255 A1 (SUNSHINE HEART COMPANY PTY LTD) 28 March 2002 See entire document	15, 33, 37, 40, 48, 50, 52

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## Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos :  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos :  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

## Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See extra sheet...

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

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**Supplemental Box**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: II**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions.

When all of the claims are considered together, it is not clear what combination of integers defines the invention. This is because different claims have different combinations of integers.

1. Claims 11-32, 54 and 56 require resection of the aorta while claims 1-10, 33-53, 55, 57-80 involve extra-aortic counter pulsation. The device of the first group applies compressive force directly on the blood, while the second group defines a device that applies compressive force to a portion of the vessel.
2. Claims 48, 50 and 53 define a device that can be used to apply compressive forces on any artery, while some claims are limited to (a) ascending aorta or (b) descending aorta which require different devices due to their location and geometry. This is contrary to the stated objective (see page 2 lines 20-23) of solving the prior art disadvantage.
3. The devices of claims 48 and 51-54 restricted by a special geometry on the depression generated or the deflated part of the balloon.
4. Some claims, such as claim 40, are restricted to compress only a portion of the circumference, while others devices are not clearly restricted to "only a portion".
5. Claim 50 defines a device that can compress aorta substantially without stretching or bunching. While the device of claim 48 causes the artery to flex along a continuous line, which increases in length as the counterpulsation pressure applied to the artery increases.

The above list is not exhaustive. Because of a large number of special technical features and due to different combinations of integers the international application does not relate to one invention or to a single inventive concept.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2003/001458

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
US 6471633	AU 69241/00	CA 2382671	EP 1207921		
	WO 0113974				
US 4051840					
US 4630597					
US 4979936					
WO 0224254	AU 90088/01	BR 0114087	CA 2421812		
	EP 1379294	US 2003233023			
WO 0076288	AU 50548/00	BR 0011464	CA 2375962		
	EP 1185319				
US 4583523					
US 6030336	EP 0959912	FR 2744924	WO 9730740		
US 6045496	AU 27784/95	CA 2165164	EP 0706343		
	US 6186149	WO 9528127			
WO 0224255	AU 91488/01	EP 1318848			
END OF ANNEX					